

Translated from German by
SCIENTIFIC TRANSLATION SERVICES
411 Wyntre Lea Dr.
Bryn Mawr, PA 19010

(19) FEDERAL	(12) Offenlegungsschrift	(51) Int. Cl.⁵:
REPUBLIC	(11) DE 39 23 241 A1	B 01 J 2/00
OF		
GERMANY	(21) Reference No.:	B 29 B 9/00
	P 39 23 241.7	G 05 D 11/04
GERMAN	(22) Application date:	
PATENT	7/14/89	
OFFICE	(43) Date laid open to	
	public inspection:	
	1/24/91	

(71) **Applicant:**
Dietrich Reimelt KG,
6074 Rödermark, DE

(72) **Inventors:**
Reimelt, Wolfram, Cert.
Eng.; Dietrich, Peter,
Rödermark, DE

(74) **Agent:**
Eyer, E., Cert. Eng.; Linser,
H., Patent Attorneys,
6072 Dreieich

(54) Process and Device for Preparing Granular Products

The present invention pertains to a process and a device for carrying out the process for the continuous preparation of granular products of a predetermined and constant formula consisting of a plurality of components present in different percentages with a defined accuracy, wherein the individual input components can be fed to an extruder and a downstream granulator via respective weighing tanks and centrally controlled metering devices. The properties or features of the granular product, which are to be maintained at a defined accuracy, are continually measured in an analysis station, and the results of the measurement are fed into a computer to determine actuating variables for controlling the metering devices of the input components. A transport path control of the granular product can be activated by the computer such that in the case of a predetermined deviation of the measured values from the set point, the granular product deviating from the set point is collected separately, its quantity and its measured values, which deviate from the set point, are recorded, and it is fed as an additional (secondary) input component in parallel to the (primary) input components to the inlet via a weighing tank and a metering device in a computer-controlled manner.

Specification

5 The present invention pertains to a process for continuously producing granular products of a predetermined and constant formula, which consist of a plurality of components present in different percentages, wherein the individual input components are fed to an extruder and a downstream granulator via respective weighing tanks and centrally controlled metering devices.

10 The present invention also pertains to a device for carrying out this process.

15 It has been known that granular products, which consist of different components present in different percentages according to a predetermined formula, are prepared for manufacturing plastic parts possessing certain features and properties, e.g., color and strength. The percentages of the components differ greatly especially in the case of the manufacture of plastic parts of a certain color that is to be exactly maintained, so that the maintenance of these percentages is particularly critical. This analogously applies to other features and properties as well.

20 The individual components taken from silos or containers must therefore be mixed and fed to an extruder in a very accurate dose for the continuous production of a granular product for manufacturing plastic parts with formulas that are to be maintained especially accurately.

25 It may happen during such a process that disturbances, which lead to deviations in the formula, occur in the metering devices or other units. It is inevitable, particularly during the start-up phase of the production, that the exact formula and the exact mixing ratios will become established only after a certain time and the granular product produced during this time necessarily has deviations from the desired properties.

30 Such a granular product, which may consist of high-quality components, can now be used only for second-source products of a "second choice." This is highly disadvantageous especially because the deviations from the formula are not uniform, but change during each phase in time of a disturbance or the start-up phase. The second-source products or the products of a second choice will therefore also vary. The deviations can be made "uniform" only by collecting and mixing the granular product with deviating properties.

35 The basic object of the present invention is to completely avoid the production of second-source products or products of a "second choice" from a granular product that deviates from the formula and was produced during the start-up phase or during a disturbance.

40 This object is accomplished according to the process according to the present invention by continuously measuring the properties or features of the granular product, which are to be maintained with a defined accuracy, in an analysis station and feeding the results of the measurements into a computer for determining actuating variables for controlling the metering devices of the input components, and by a transport path control of the granular product being able to be actuated by the computer such that in the case of a predetermined deviation of the measured values from the set point, the granular product deviating from the set point is collected separately, its amount and its measured values deviating from the set point are recorded, and it is fed as an additional (secondary) input component in parallel to the (primary) input components to the inlet via a weighing tank and a metering device in a computer-controlled manner.

45 Each granular product deviating from the set point is collected separately due to this measure according to the present invention and is fed again to the inlet of the process. Since the magnitudes of the deviations and the amounts displaying these deviations were measured, these values can be used to control the metering device.

50 According to the present invention, the transport path control actuated by the computer feeds the granular product, which was produced according to the

formula and with preset accuracy, in which the desired measured values were consequently accurately maintained, to an output storage facility for the intended use.

5 A mixer, which is designed as a static mixer, is advantageously associated with the output storage facility for receiving the granular product produced according to the formula.

10 The (primary) input components consist of basic materials and fillers in the liquid, powdered and/or granular form, wherein each input component is assigned to a weighing tank with a computer-controlled metering device.

15 The measurements in the analysis station are performed during the entire production process and batches with different deviations from the set point are always stored separately, their amounts and their measured values deviating from the set point are recorded and they are fed as additional (secondary) input components to the input in parallel to the (primary) input components via a weighing tank and a metering device in a computer-controlled manner.

20 According to the present invention, a feature of the granular product that is to be maintained with defined accuracy is its color, which is continually measured on the analysis station, and the results of the measurements are fed into a computer to determine actuating variables for actuating the transport path control and the metering devices.

25 The device for carrying out the process has an extruder, upstream of which a number of weighing tanks with a respective downstream, computer-controlled metering device are arranged in parallel to one another to feed a mixture of different (primary) input components in different percentages and (secondary) input components as granular products with different deviations from the set point. One weighing tank with a metering device is provided for each component. The extruder is followed by a granulator, which feeds the granular product produced in it to a pneumatically operating transport means, which feeds the granular product to a number of output containers or return containers via at least one computer-controlled transport path control. An analysis station is advantageously arranged between the granulator and the first transport path control.

40 In a variant of the present invention, each return container has a weighing tank, whose outlet is connected via a metering device to a pneumatic transport means, which leads to at least one input container via a transport path control.

45 The present invention will be described in greater detail based on the figure, which schematically shows a unit for carrying out the process.

50 The containers 4, 5 and 6, which are arranged in parallel to one another, are charged with basic materials and fillers in the direction of the arrow 3 by means of transportable vessels 1 and 2 or other transport means for producing a plastic product. A weighing tank 7, 8 and 9, which is equipped with an automatically operating, computer-controlled metering device 10, 11 and 12 each, is arranged downstream of each container 4, 5 and 6. The metering devices are controlled and the metering values are recorded by means of a computer, not shown in detail.

60 The basic materials and fillers arriving from the metering devices are fed to an extruder 14, optionally via a mixer 13, which is followed by a granulator 15. The granular product produced from the basic materials and fillers here is fed by means of a pneumatically operating transport means 17 via a transport path control 18 either to a preliminary container 20 with a weighing tank 21 joining it or to the output containers 22 and 23 via an additional transport path control 19.

70 An analysis station 24, by which samples of the granular product are taken continuously from the transport means, is located in front of the first transport path control 18.

A transport line 25 leads from the outlet of the weighing tank 21 via a transport path control 26 to the containers 27 and 28, which are connected in parallel to the containers 4, 5 and 6. The container 27 is also equipped with a weighing tank 28, which is joined by a metering device, which is likewise computer-controlled.

The process according to the present invention thus takes place as follows.

The materials contained in the containers 4, 5 and 6, namely, natural granular products as basic materials as well as fillers, are fed to the extruder 14 via the containers 7, 8 and 9 and via the metering devices joining them. The metering devices are controlled by a computer, not shown in detail, based on the formula fed into it. A granular product is produced in the extruder 14, and via a granulator 15, the granular product subsequently forms a product, which is introduced into a pneumatically operated transport means 17 via the container 16. This pneumatic transport means 17 delivers the material into an intermediate container 20, where the product can be weighed and stored. Continuous or intermittent checking of samples of the material is performed on this intermediate path. The values checked are transmitted to the computer at each point in time, so that the computer checks the state of the product and independently changes the composition based on the formulas, which are likewise fed into it. This ingoing material, collected in the container 20, does not yet correspond to the desired state, is filled into the container 20 or additional containers until the computer finds the product to be good and fit for use. This computer is supported by a color computer, which also measures and stores the color composition during the checking and sends the values to the higher computer. This higher computer now compounds a mixture with the start-up material or the primary input components so that an end product is produced that meets all preset specifications. It calculates the actuating variables for all metering devices and brings about their actuation.

When production produces a product that is recognized as good, this product is delivered into the containers 22 and 23 by actuating the transport path controls 18 and 19, it is recorded there and is subsequently fed into a homogenizing mixing silo 30, which is designed as a static mixer.

Should a product that is considered to be poor by the analysis station be produced for any reason during the production due to failure of scales or other units, this material is again fed into the containers 20 and 21 by actuating the transport path control, and the material is sent from these containers 20 and 21 to the input containers 27 and 28 or other buffer containers via the transport line. The computer has all the data necessary for this, especially the features and properties of the amounts removed from the process, their amounts and their storage place, so that it controls all metering devices based on these data such that an end product that fully corresponds to the desired state can be produced with the returned secondary input component and the primary input components. The total amount of the material fed to the input is thus used for producing an end product according to the formula.

Patent Claims

1. Process for continuously producing granular products of a predetermined and constant formula with defined accuracy, which consist of a plurality of components in different percentages, wherein the individual input components can be fed to an extruder and to a granulator following same via weighing tanks and centrally controlled metering devices, characterized in that the properties or features of the granular product, which are to be maintained with a defined accuracy, are continually measured in an analysis station and the results of the measurements are fed into a computer for determining actuating variables for controlling the metering devices of the input components, and that a transport path control of the granular product can be actuated by the computer such that in the case of a predetermined deviation of the measured values from the set point, the granular product deviating from the set point is collected separately, its amount and its measured values deviating from the set point are recorded, and it is fed as an additional (secondary) input component to the inlet in parallel to the (primary) input components via a weighing tank and a metering device in a computer-controlled manner.

2. Process in accordance with claim 1, characterized in that if the desired measured values are maintained, the transport path control actuated by the computer feeds the granular product produced according to the formula to an output storage facility.

3. Process in accordance with claim 1 or 2, characterized in that the output storage facility for receiving the granular product produced according to the formula is associated with a mixer.

4. Process in accordance with claim 1, 2 or 3, characterized in that the (primary) input components consist of basic materials and fillers in the liquid, powdered and/or granular form, wherein each input component is assigned to a weighing tank with a computer-controlled metering device.

5. Process in accordance with claim 1 or one of the claims following it, characterized in that the measurements of the analysis station are carried out during the entire production process and batches with different deviations from the set point are stored separately, their amounts and their measured values deviating from the set point are recorded, and they are fed as additional (secondary) input components in parallel to the (primary) input components to the inlet via a respective weighing tank and a metering device in a computer-controlled manner.

6. Process in accordance with claim 1 or one of the claims following it, characterized in that a feature of the granular product to be maintained with a defined accuracy is its color, which is continually measured in the analysis station and the results of the measurement are fed into the computer for determining actuating variables for controlling the transport path control and the metering devices.

7. Device for carrying out the process in accordance with the above claims, characterized in that a number of weighing tanks with a respective downstream, computer-controlled metering device are arranged in parallel to one another upstream of an extruder for feeding a mixture of different (primary) input components in different percentages and (secondary) input components as granular products with different deviations from the set point, wherein one weighing tank with a metering device is present for each component, and the extruder is followed by a granulator, which feeds the granular product produced by it to a pneumatically operating transport means, which feeds the granular product to a number of output containers or return containers via at least one computer-controlled transport path control.

8. Device in accordance with claim 7, characterized in that an analysis station is arranged between the granulator and the first transport path control.

9. Device in accordance with claim 7 or 8, characterized in that each return container has a weighing tank, whose outlet is connected via a metering device to a pneumatic transport means, which leads to at least one input container via a transport path control.

Attached: 1 page(s) of drawings

- Blank page -

DRAWINGS PAGE 1

No.:

Int. Cl.⁵:

Date. laid open:

DE 39 23 2451 A1

B 01 J 2/00

January 24, 1991

